Art. V.—THE NATURE AND TREATMENT OF EPILEPSY.

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EPILEPSY must be looked upon as a cerebral affection. To understand it, it is necessary first to consider the character of its attack. This consists, in the first place, of psychic changes of the most diverse forms and degrees. In those cases which we designate "Street Epilepsy," and which with most physicians and the laity, passes for the typical form, there is doubtless loss of consciousness, which, after the cessation of the convulsions is succeeded by a degree of deafness, confusion of thought and sopor. Nevertheless, unconsciousness is not the invariable form of mental disturbance which takes place in epileptic seizures. In the variety which we call "psychic tic," there is not complete unconsciousness, since patients do not fall, and even hold things firmly in the hand. After the seizure, however, they cannot recall what has transpired. During the fit mental disturbance may present all varieties. The patient may appear to be more or less like one dreaming; may perform simple acts as if automatically; or, again, there may be coherent operations of consciousness, the patient being able even to answer questions put to him. After the seizure there is no recollection of anything which has occurred, except, perhaps, in the earliest and latest moments. During the seizure, also, the psychical condition may have the character of insanity or of *raptus melancholicus;* at least in the outbreak of the epileptic attack the mental disturbance may be of this character. These psychic changes constitute the most important moment of the epileptic seizure, and we even denominate all those cases epilepsy (psycho-epilepsy) which manifest themselves in greater or less degrees of mental confusion.

Second in importance is the convulsion, which in many cases may be absent for years. These muscular contractions also present many varieties. They may be partial, e. g., limited to an upper extremity and the face, unilateral or general. These different forms may develop one into the other, or may alternate in the course of the disease. The spasm may assume the form of either a clonic convulsion, or of a clonic succeeded by a tonic, or of a combination of the two forms. Further, the attacks may present the character of co-ordinated, associated and automatic movements. The epileptic seizure thus, in its nature, approximates to *chorea major* and insanity. There are also forms of the greater St. Vitus' Dance, in which there are lucid intervals between attacks, of greater or less duration—these forms are attended by psychic modification with the most diverse forms of abnormal muscular movements. Such forms of chorea major we may as well call epilepsy, and thus we do denominate those cases, which we are certain are superincumbent upon some preceding disease, as for instance prominently those which take place during the years of puberty.

That epilepsy may have the character of insanity is amply verified by the fact that patients are frequently believed to be insane by the bystanders, and are conveyed to the asylum.

Above all, epilepsy stands in the closest relationship to the psychoses. Not only are epileptics, after repeated violent attacks, temporarily or permanently imbecile, but in the course of their disease the insane may be afflicted with epilepsy, and we shall soon learn the reason of it in the *rôle* which the cerebral hemispheres play in the production of convolutions.

Concerning the mechanism of epilepsy, we are able to state definitely that it is *vaso-motor.* It is a very common occurrence that vaso-motor disturbance, which is outwardly recognizable, e. g., partial pallor, or redness of the face, coldness or heat in the extremities are the introductory, and oftentimes the premonitory symptoms, continuing for hours, and during the epileptic seizure itself we may observe the greatest anomalies of pulse in different peripheral arteries, especially the carotid. The question whether hyperæmia or anæmia is at the basis of epilepsy is not universally decided.

The experiments of Kussmaul and Tenner, as well as the numerous pathologico-clinical facts in cases of hemorrhages into the brain and spinal cord, seem to confirm the view that the principal cause of these attacks is anæmia of certain parts; yet we cannot deny that congestion may also be the cause of epileptic seizure. It must be emphasized that preeminently a lowered activity of nutrition within the cerebral portions of the brain, predisposes to epilepsy, especially inflammation followed by atrophy of the cerebral substance. On the other hand, we witness the eclamptic attack in meningitis, with hydrocephalus combined with congestion. Observations concerning the relation of the circulation to the periphery, give us a much more imperfect conception of the relations of the circulation inside the brain than is generally supposed. Pallor of the face in the beginning of the attack, indicates a spasm in the course of the external carotid, and we are able to conclude *a priori* that consequently an additional pressure is caused by expansion of the internal carotid. Yet we frequently observe, that along the course of the carotid external, hemorrhage takes place into the skin, indicating an abnormal increase of blood pressure. This, however, does not indicate that in this case the internal carotid is subjected to increased pressure; the opposite may be the fact, and we observe in such hemorrhages no injection of the orbit.

It is certain that there is an increased pressure in the brain during epileptic seizures, and that many epileptics die from cerebral hemorrhage during the fit. Also, the observations of Schroeder van der Kolk, who found hyperæmia in the medulla oblongata; in many epileptics, go to support the fact that hyperæmia is, at least, the frequent cause of epileptic seizures. Further, in reference to the mechanism of the seizures, we should say that the mental disturbance and the convulsions are dependent upon the special, vascular region which is attacked in the particular epileptic seizure, and upon the intensity of the attack. According to the experiments of Kussmaul, Tenner and Nothnagel, and the pathological experiences of Schroeder van der Kolk, there seems to be no room for doubt that the typical form of the convulsion in street-epilepsy, results from a sudden vaso-motor disturbance in the medulla oblongata, while in those cases which have the character of chorea major or insanity, we must refer the disturbance of the circulation to the cortical motor centre, etc. Everything depends also upon the kind, the intensity, the region and the extent of the circulatory disturbance in the hemispheres, and which psychical character the particular attack may assume.

A very important matter in epilepsy, is the *prodromata.* These are, for the most part, disturbances of the sensory and motor functions, which are generally felt a few moments prior to the seizure. We witness these prodromes mostly in reflex epilepsy—so-called, which is that form in which the disease originates in a peripheral nerve or the ultimate termination of nerves in various organs. Such prodromes seldom appear, but we can say that there are few cases in which prodromal symptoms are wholly absent. An important prodromal symptom is that vaso-motor disturbance which consists usually, of partial, vascular contraction and dilatation, effecting first one set of vessels then another and *vice versa.*

Still another, is the psychic disturbance. Hours and even days before the seizure, patients are ill-humored and passionate, lose their acuteness of perception and retention of impressions. It must, in general, be extremely exceptional that an epileptic attack actually begins as *ictus epilepticus.*

In the etiology of Epilepsy, *eclampsia infantilis* takes the first rank. In by far the majority of cases, there is a close relationship between the two diseases, and the relation is so intimate, that children who have suffered from one or more eclamptic seizures, may have epilepsy in the years of puberty. Frequently the fits do not fully let up but continue during the whole time between *eclampsia infantilis* and *epilepsia pubertatis*, or they occur as a connecting link between the two diseases, when it takes the character of acute cerebritis, or hemiparesis with or without muscular contraction, tremor and the like. These causes operate for the production of true epilepsy in an overwhelming majority of cases and even there, where seemingly the epilepsy is occasioned by shock, the relationship with earlier *eclampsia infantilis* can be demonstrated.

A second important cause of epileptic attacks, is disease of the cerebral hemispheres, particularly abcess, chronic inflammation of the hemispheres, teriminating in abcess or atrophy, or hemorrhage into the hemispheres and membranes. As a rule, we are able to diagnosticate between so-called true epilepsy proceeding out of *eclampsia infantilis*, from the symptomatic variety which arises from recent organic diseases of the hemispheres, because in the latter, there are muscular contractions of one side with which disturbance of the mental faculties is not, until later, associated. Besides, the initial symptoms, or the general course of the combined phenomena are usually so clear that a confounding of the two is hardly to be found. In the introduction I gave prominence to the complications which enable us to localize the seat of the trouble in so-called symptomatic epilepsy, according to the accompanying symptoms.

Of a still wider etiological significance, is irritation of the peripheral nerves, e. g., injury of the cutaneous nerves, or of the splanchnic nerves; protracted irritation, as in helminthiasis or from irritability of certain organs, as we may witness in so-called hysterical epilepsy and ovaralgia. The differential diagnosis in these two conditions is not generally difficult, for symptoms appear first in those organs from which the disease is reflected. Yet, I remark that the fact that prodromal symptoms are constant in some part of the body, does not enable us to conclude in reference to the future cause of the disease, for in central irritation even before unconsciousness sets in, certain paræsthesiæ and motor irritability in the periphery may appear as eccentric phenomena.

Independent of it, though epilepsy may appear upon irritation of the convolutions and central portions of the brain, the attack is, doubtless, associated with a marked disturbance of the circulation. The seizure may also result from irritation of the parts which influence the vaso-motor centres of the periphery and different sections of the central nervous system. And if we consider that we generally have every reason to transfer a great part of the vaso-motor centres as well for the peripheral vessels, as for the circulation within the cranium, to the medulla oblongata and the spinal cord, then the broader signification of Schroeder van der Kolk's discovery becomes evident without one being obliged to perpetrate the physiological nonsense of transferring the sensorium to the medulla oblongata, as Stilling and Schroeder van der Kolk have done by reason of erroneous anatomical data, and as has been done to a remarkable degree by many uncritical, modern authors who have fallen into their errors.

An important *rôle* in epilepsy is played by the cornu ammonis, the physiological function of which is, at present, not all understood. It is pre-eminently a service rendered by Meynert, instigated by a communication from Meschede, that he has drawn attention to this portion in epilepsy and discovered frequent participation, and even atrophy of the cornu ammonis. Perhaps the affection of this organ generally signifies no more than disease of some superficial part of the hemispheres.

The *causes* of epilepsy are manifold, and disturbances of digestion and mental impression hold an important place. Causes are peculiar to individuals. I observed a case in which the seizure, at least for a long time, occurred only when the patient stooped in order to tie his shoe. In another patient the seizure occurred only when he was awakened in the morning. We must be very cautious in judging of these causes, because it is easy to be deceived when patients make such specific statements, and even a critic cannot contradict them, for seizures may not follow these acts in every instance, and then again, it can be shown that many attacks result from other causes. In another case the seizure took place only when the patient—a female—had consummated the coitus. She stated that she had been much addicted to masturbation, and felt no desire during intercourse, but considerable erethism came tardily afterwards, and then peculiar sensations proceeding from the region of the ovaries, and creeping up as far as the larynx, when there occurred either an epileptic convulsion, or sensations, which went no further than the prodromal symptoms. This patient stated distinctly that she had never had an epileptic attack without the prodromes enumerated preceding it. Still another patient stated that he suffered from frequent seminal emissions, *i. e.*, sexual desire, with a similar passing off of the sensations as in the case of actual coitus, and immediately thereupon came the epileptic attack.

Let us now consider the therapeutics of this disease. There is perhaps hardly a disorder wherein the therapeutic zeal of physicians is so frequently rewarded, and where unscientific treatment so often fails. The treatment which has come most prominently to the foreground at the present day, is that by bromide of potassium, which should be administered in large doses (½ to 1, up to 4 to 6 grammes) once or twice a day. By this means, without doubt some are cured, in many there is a marked improvement as to the frequency and intensity of the attacks, at least for a long time. Only very seldom is there no good effect. This action has been attributed to the potassium, *par excellence*, and hence it is stated that similar preparations of potassium, e. g., chlorate of potassium, have a similar therapeutic value. The same is said of the sodium-salts. I have made no extended parallel experiments, but after various isolated experiences, this opinion does not seem to me to be correct. Several times I have observed that patients who had been treated with perfect safety by bromide of potassium, and much relieved, relapsed upon the use of other potassium-salts, and were benefited again immediately upon the resumption of the bromide. Ill effects which follow the use of the bromide almost exclusively, before all the exanthemata, have certainly for those cases which are favorably influenced, no weight in comparison to the frightful character of the Sacred Disease. I insist, somewhat strenuously, that patients shall not wholly discontinue the use of the bromide, even if I do from time to time during a protracted freedom from the symptoms, permit the doses to be taken less frequently, and in considerably diminished size. During menstruation, also, I direct at least *one* dose, and I have become convinced that pregnant women may continue to use the drug with impunity to the time of their delivery. The question whether wet nurses can take the drug, I believe, after experience, should be answered in the negative; and I would never advise any female patient who suffers from epilepsy, and who moreover takes the bromide, to nurse the child herself. There is perhaps no doubt that the bromide exerts in time a lasting influence upon the intellectual faculties, which does not, however, justify a total discontinuance of the drug, since there is less harm done by it than by frequently repeated epileptic attacks. In the hysterical varieties the bromide does not, as a general thing, seem to effect the prognosis less than in other forms of convulsive disease.

Another important drug is belladonna and atropia, which in increasing doses taken for a long time, and the dose lessened upon the commencement of intoxication, but not wholly abandoned, may have a beneficial effect upon the disease. The question when we should prescribe bromide of potassium, and when atropia, I would answer by saying that atropia must be reserved especially for those times and cases in which convulsions follow close one upon another with such severity that the life and intelligence of the patient are greatly endangered. Then atropia frequently renders surprising service. The opinion of Schroeder van der Kolk, that preparations of belladonna exert a bad influence upon the intelligence of the patient, I believe, after experience, during the time before the universal introduction of the bromide, to be correct.

A drug of which we ought to expect much as an antispasmodic—namely, curare—is in the highest degree uncertain. It is true I have reported a few cures, and one cured case I had under my observation for many years, but these cases were exceptional experiments. It does not surprise me that curare is generally unreliable, now that we know that it does not operate upon the vaso-motor nerves, and epilepsy is without doubt essentially a vaso-motor neurosis.

The zinc preparations and nitrate of silver are only exceptionally beneficial, and the effect is principally due to the fact that they operate upon a special, but obscure cause of the suffering, e. g., upon irritations of the pneumogastric nerve. It would be supposed that secale cornutum might be very advantageously employed as an anti-epileptic; at all events it should be submitted to careful experimentation.

Quinia and iron probably work favorably only in hysterical and hystero-anæmic conditions. Iodide of potassium and mercury are useful not only in syphilitic complications, but especially in symptomatic epilepsy. Hydropathic and thermal measures are universally prized in hysterical cases, and now and then in symptomatic cases. Iron baths are useful in the hysterical variety, but it must be borne in mind that the spasms increase very considerably during the ferruginous treatment; a good result, however, ultimately follows. Electricity is useful in the more violent hysterical variety, particularly galvanization along the spine. In general, I find electricity especially indicated where in the intervals there is considerable disturbance of the sympathetic, particularly of the facial branches, etc., the treatment being directed to the special symptoms, e. g., galvanization of the sympathetic and plexus in prodromal disturbances in the upper extremities. In reflex epilepsy the experiment may be made upon the peripheral nerves. Sometimes this is followed by decided benefit.

It is especially true of epilepsy, that the physician who studies the disease most diligently, observes most critically the prodromata and different forms of attack, and is swayed by the noble ambition to do all that can be done to help, will achieve greater success than he who heedlessly observes and treats this disease.

The pathological anatomy of epilepsy furnishes very little of practical importance. Whether in the true and reflex forms there is a lesion, and through the affection of the cerebral hemispheres the centre becomes diseased, is unknown, or whether the cornu ammonis is such a centre.

Vascular dilatation in the medulla oblongata seems to occur only secondarily, in consequence of the vascular excitement attending many attacks.